



E1/T1 Voice Compression Module



FEATURES

- Provides direct connection to E1/T1 PBX trunks
 - Compresses half or full PBX E1/T1 trunk
 - Selectable voice compression rates:
 - G.723.1 (MPMLQ) for high-quality voice at 6.4, 9.6, 11.2, 12.8 or 16 kbps per channel
 - Proprietary technique for only 4.8 kbps per channel
 - Enables support of up to 186 voice channels in a single Kilomux-2100 chassis
 - Group III Fax relay support up to 14.4 kbps, with automatic rate fallback
 - V.22 bis and V.32 bis modem data relay at 2.4 to 14.4 kbps rates
 - Integral echo canceller
- Low end-to-end delay
 - Supports CAS signaling methods: DTMF, R1-MF, R2-MFC
 - Supports CCS signaling methods: SS7, ISDN PRI
 - Supports applications requiring double compression (tandeming)

DESCRIPTION

- KVF.6 is a Kilomux-2100 voice module providing high-quality compression of a half or full E1/T1 digital PBX trunk (see *Figure 1*).
- Two-slot version KVF.6 modules can compress a full E1/T1 and thus enable compression of up to six E1/T1 trunks (186/144 voice channels) in a single Kilomux-2100 unit (see *Figure 2*).
- Used in CVS (Compressed Voice System) applications, the aggregated data streams of two Kilomux-2100 units, equipped with six KVF.6 modules each, are transmitted via an E1 or T1 main link Megaplex-2104 access multiplexer. This application can compress and transmit a total of 11.5 E1 (345 voice channels) or 12 T1 (288 voice channels) trunks over a single E1 or T1 link (see *Figure 4*). Alternatively, the Kilomux-2100 units can transmit their compressed voice channels via DXC, FCD, or other standard E1/T1 access devices.
- Voice compression is performed at selectable data rates of 4.8, 6.4, 9.6, 11.2, 12.8 or 16 kbps per channel. The digitizing rate is soft-selectable per quartet of channels, according to the quality desired and the available main link bandwidth. For data rates of 6.4 to 16 kbps, voice compression is based on the MPMLQ (Multipulse Maximum Likelihood Quantization) speech coding technique, as per ITU-T G.723.1. Compression at 4.8 kbps uses a proprietary compression technique.
- Very high voice quality (comparable to 32 kbps ADPCM) is achieved when using compression rates of 6.4 kbps and above.
- Automatic voice/fax detection ensures that each channel can be used for both voice and fax. Group III fax is supported. Automatic rate fallback to drop to the highest common rate supported by both faxes is featured.
- Each KVF.6 channel also supports automatic detection and relay of V.22 bis and V.32 bis data modem transmissions at standard rates of 2.4, 4.8, 7.2, 9.6, 12 and 14.4 kbps.
Note: Fax/data modem transmission requires additional channel bandwidth for overhead so that, for example: 14.4 kbps fax/modem data rate requires 16 kbps channel bandwidth.
- The KVF.6 module is compatible with the KVF.8 analog voice interface module. When operating opposite a KVF.8 module, the KVF.6 can be configured to handle different groups of eight channels each, routed independently to different KVF.8 modules (see *Figure 3*).
- A built-in adaptive echo canceller is used for canceling the near-end hybrid echo. The echo canceller enables acceptable voice quality on voice lines with a long delay, such as long-distance calls or calls over non-terrestrial links (e.g. satellite). Near-end delay of up to 15 msec is supported.

KVF.6

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- Voice quality is maintained at a channel bit error rate of 1×10^{-3} or better.
- Diagnostics include digital loopback toward the local PBX interface and digital loopback toward the remote site PBX. Tone injection (per channel quartet) for testing is also available. An automatic self-test is performed during power-up and is constantly running during normal operation.
- Signaling transmission is supported for either CAS (Channel Associated Signaling), or CCS (Common Channel Signaling). When working in CAS mode KVF.6 passes bits A, B, C and D in the voice band, without any overhead. The CCS information can be transmitted transparently at 64 kbps, or HDLC compression can be applied to reduce the necessary bandwidth to as low as 9.6 kbps.
- With CAS signaling, KVF.6 supports R1-MF and R2 MFC, as well as DTMF signaling standards. With CCS signaling, SS7 and ISDN PRI standards are supported.

Note: SS7 signaling transmission is supported only at 64 kbps.
- Applications requiring double compression are supported. For example, voice communication between remote locations can be connected in a star configuration to a central PBX. In such a case, the switching is performed by the PBX and requires compression and decompression to be carried out twice. KVF.6 supports this application for voice, with fax and data modem relay, due to its high-quality compression technique.

SPECIFICATIONS

GENERAL

- **Number of Voice Channels**
 KVF.6/12T: 12 channels
 KVF.6/16E: 16 channels
 KVF.6/24T: 24 channels
 KVF.6/31E: 31 channels
- **Digitizing Techniques and Supported Compressed Voice Channel Data Rates**
 G.723.1 MPMLQ:
 6.4, 9.6, 11.2, 12.8 or 16 kbps
 Proprietary technique: 4.8 kbps
- **Bandwidth Allocation on Main Link (per voice channel quartet)**
 4 x 4.8 kbps: 19.2 kbps
 4 x 6.4 kbps: 25.6 kbps
 4 x 9.6 kbps: 38.4 kbps
 4 x 11.2 kbps: 44.8 kbps
 4 x 12.8 kbps: 51.2 kbps
 4 x 16 kbps: 64 kbps

APPLICATIONS

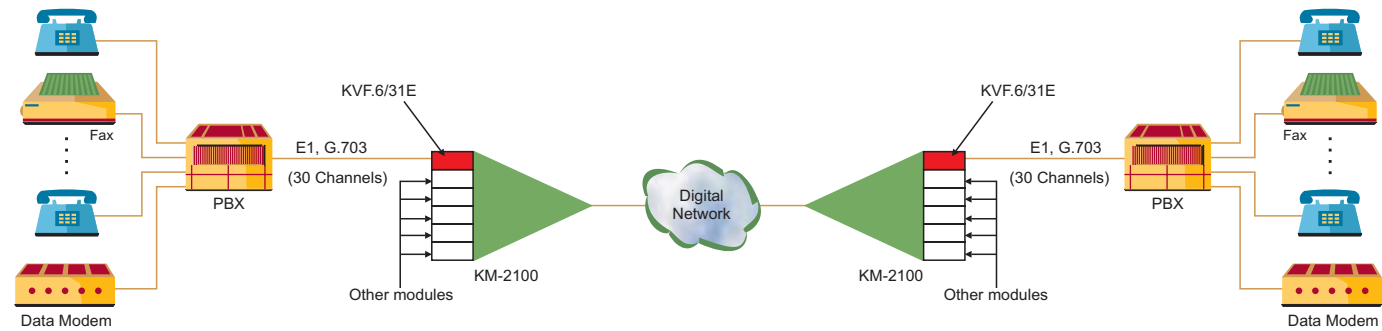


Figure 1. Basic KVF.6 Compression Application of Single E1 Trunk

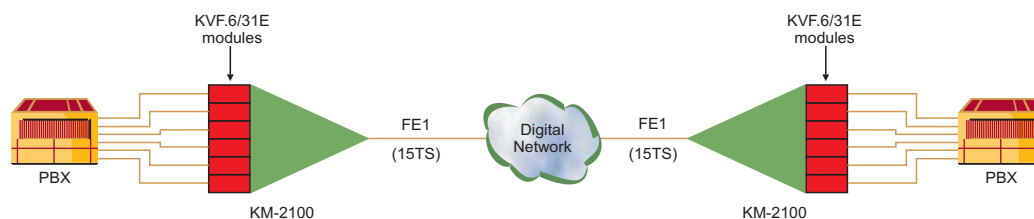


Figure 2. 12:1 Compression of 6 Full E1 Trunks using 4.8 kbps Channel Rate, over Fractional E1 Link

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- Fax Compatibility**
 Group III according to ITU-T Rec. T.4, T.30, V.29, V.27, V.27ter
- Data Modem Compatibility**
 V.22 bis, V.32 bis
- Supported Fax/Modem Data Rates at Selected Channel Rate (in kbps)**

Ch. Rate:	Fax/Modem Rates:
4.8	2.4
6.4	2.4, 4.8
9.6	2.4, 4.8, 7.2
11.2	2.4, 4.8, 7.2, 9.6
12.8	2.4, 4.8, 7.2, 9.6, 12
16	2.4, 4.8, 7.2, 9.6, 12, 14.4

 (all with automatic rate fallback)
- End-to-End Processing Delay**
 Less than 100 msec
- Acceptable Channel Bit Error Rate**
 1×10^{-3} or better
- Adaptive Echo Canceller**
 Echo path length: 15 msec
 Echo return loss enhancement (ERLE): >30 dB
 Convergence speed:
 Better than ITU-T G.165

- Signaling Transmission Modes**
 CAS:
 - A, B, C, and D bits transferred in the compressed voice bandwidth (in-band)
 - Polarity for the signaling bits is user-selectable
 CCS:
 - Signaling protocol timeslot assigned (i.e. 1 to 31 for E1, 1 to 24 for T1) is transferred transparently (using 64 kbps), or as HDLC compressed data (using 32, 16, or 9.6 kbps) in Kilomux frame bandwidth
- Timing Modes**
 INT mode:
 Clock is provided by KM-2100 to the PBX
 LBT mode:
 Clock is provided by the PBX to KM-2100
- Diagnostics**
 Activated from local or remote site:
 - Digital loopback towards local PBX
 - Digital loopback towards remote PBX
 - 1 kHz tone injection per channel quartet
 Auto self-test activated upon power-up and during normal operation
- Indicators**
 - Local Sync Loss (Red Alarm)
 - Remote Sync Loss (Yellow Alarm)
 - Test
 - Alarm

- Physical**
 Number of I/O slots occupied by module:
 - KVF.6/12T: 1
 - KVF.6/16E: 1
 - KVF.6/24T: 2
 - KVF.6/31E: 2

Power Consumption

Voltage	Current	Power
+5V (12T)	800 mA	4.0W
	(16E) 980 mA	4.9W
	(24T) 1120 mA	5.6W
	(31E) 1380 mA	6.9W
+12V (all)	3.6 mA	0.043W
-12V (all)	1 mA	0.012W
Total (31E1)	1384 mA	7.0W (max)

- DL Connector**
 3-pin connector for downloading software upgrades
Note: a matching CBL-KVF6/8-DL cable, with a RS-232 DB-9 connector for downloading software upgrades from a PC into the KVF.6's 3-pin DL connector, is provided with every module.
- Configuration**
 Programmable via front panel and terminal interface, as well as via the RADview network management system

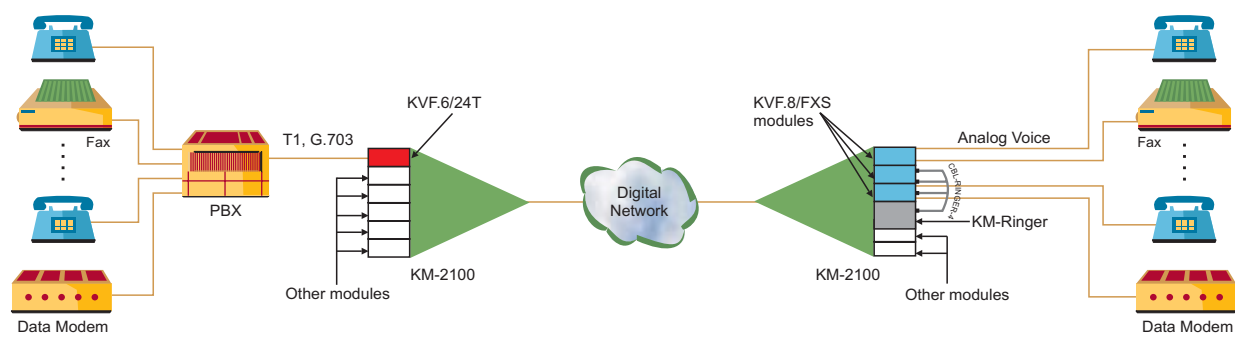


Figure 3. KVF.6 Working opposite Analog Interface KVF.8 Modules

KVF.6

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E1 PBX INTERFACE

- **Compliance**
ITU-T Rec. G.703, G.704, G.732
- **Framing with CRC-4**
 - TS 0 multiframe for CRC-4 protection, and no multiframe (G.732N)
 - TS 0 multiframe for CRC-4 protection, and TS 16 multiframe (G.732S)
- **Framing without CRC-4**
 - No multiframe (G.732N)
 - With TS 16 multiframe (G.732S)
- **Nominal Line Data Rate**
2.048 Mbps
- **Line Code**
HDB3
- **Line Impedance**
 - Balanced interface: 120Ω
 - Unbalanced interface: 75Ω
- **Signal Levels**
Transmit:
 - Balanced: ±3V (±10%)
 - Unbalanced: ±2.37 (±10%)
 Receive:
 - 0 to -36 dB with LTU
 - 0 to -10 dB without LTU
- **Jitter Performance**
Per ITU-T Rec. G.823
- **Connectors**
 - Balanced: 8-pin RJ-45
 - Unbalanced: pair of BNC coaxial connectors

T1 PBX INTERFACE

- **Compliance**
AT&T TR-62411, AT&T, Pub. 54016, ANSI T1.403, ITU-T Rec. G.703, G.704
- **Framing**
D4 (SF), ESF
- **Nominal Line Data Rate**
1.544 Mbps
- **Line Code**
AMI
- **Impedance**
Balanced interface: 100Ω
- **Zero Suppression** (user-selectable)
 - Transparent (AMI coding – no zero suppression)
 - B7ZS
 - B8ZS
- **Signal Transmit Levels**
 - Nominal level: ±3V (±10%)
 - Levels with CSU: 0 dB, -7.5, -15, -22.5 dB
 - Levels without CSU: Software-adjustable, measured at 0–655 ft
- **Signal Receive Levels**
 - 0 to -36 dB with CSU
 - 0 to -10 dB without CSU
- **Connector**
8-pin RJ-45

ORDERING

KM-2100M-KVF.6/*
E1/T1 Voice Compression Module for KM-2100/2104

- * Specify module type:
12T for half T1 trunk
16E for half E1 trunk
24T for full T1 trunk
31E for full E1 trunk

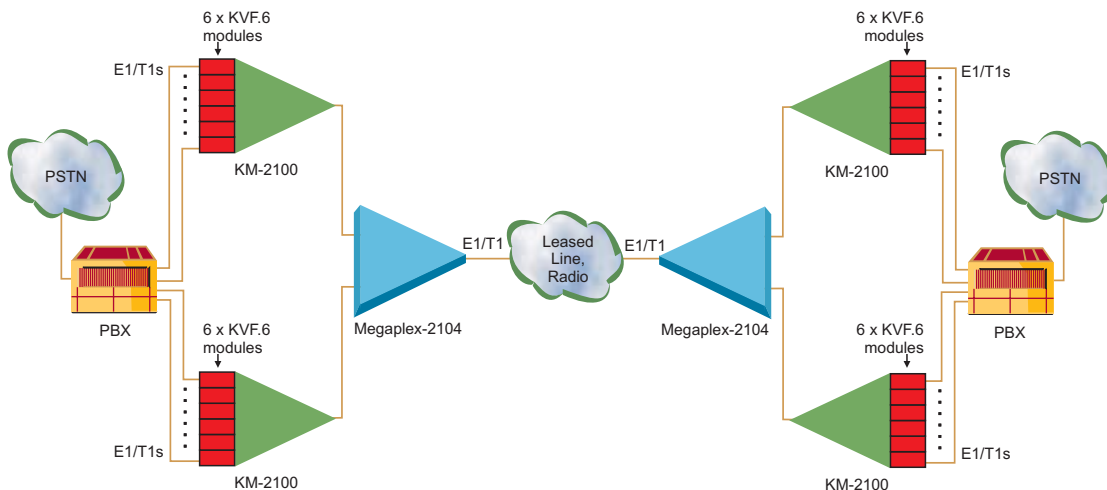


Figure 4. Compressed Voice System (CVS) Service for up to 345/288 Voice Channels over Single E1/T1



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